SCIENCE

FRIDAY, MARCH 1, 1918

CONTENTS

MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

THE SIGNIFICANCE OF THE DECLINING BIRTH RATE[1]

IT is a custom of this Section, I believe, for the retiring vice-president to select for his address a subject of national interest in the field of social economy. He is expected to avoid narrow and technical discussion of specialties but he may properly summarize the important works of other investigators in specialized fields to show their trend and bearing and he may also point out the direction which further research should take. These requirements of the occasion are all the more necessary now in view of the circumstances under which we are living. We are going through a period of serious conflict. Our nation is at present engaged in concentrating its resources of men, of materials and, above all, of thought, to make itself felt in the world struggle for preserving civilization. This is no time for trivialities or for small detail. Under these conditions, the Section on Social and Economic Science of the American Association may be expected to have a message of national import. It would be inexcusable to take your time and attention for anything but a topic of the widest practical significance in the present national emergency.

With these considerations in mind, I have chosen as the subject of this address the significance of our declining birth rate. I have done so with considerable hesitancy because of the difficulty of the subject and the importance of its present lesson. I

[1] Address of the retiring vice-president and chairman of Section I, Social and Economic Science, American Association for Advancement of Science, Pittsburgh, December 29, 1917.

shall count also on your forbearance, hoping that you will forgive the incompleteness and sketchy character of my argument. The study of American demography has convinced me that we are concerned with a problem of the greatest possible moment. Changes have been progressing in the internal structure of our population which have, for the most part, escaped attention and which, if allowed to continue, will result in very serious national embarrassment. Conditions of war bring into relief the necessity for a vigorous and efficient population. It is not too much to say that the present tendencies in our national and family life are such as seriously threaten the development of those groups in the population on which we must rely for vigor and efficiency in thought and action.

The declining birth rate has received but little scientific attention in the United States. It has been, however, the subject of very careful investigation in Europe. During the last fifty years, the birth rate has declined in virtually every country of the civilized world. Some countries have been affected more than others, but the phenomenon has been observed in extreme form in one country, namely, France. France has made an experiment in birth control on a national scale. All the parts of that experiment, including the end result, are now on view and available for scientific observation and comment. Before the present war, France had already reached a point where her birth rate had decreased to a point below her death rate; her population was actually decreasing. But for ten years before that time, the approaching crisis had called for the careful attention of her best minds.

A commission on depopulation composed of statesmen and sociologists was appointed to study the problem and a series of comprehensive reports[2] on the sources of depopulation have been prepared. These reports are too elaborate for detailed description here. I shall rather present the situation for France, as I understand it, in broad outline, bringing into relief only the main findings of the commission.

Let us consider the growth of population during the last century in the three leading countries of western Europe, namely, France, the United Kingdom and the states composing the German Empire.[3] At the beginning of the nineteenth century France was the leader of the three countries, with a population of about twenty-nine million. The states which now compose the German Empire were second, with a population of about twenty-three million, and the United Kingdom stood third with a population of about eighteen million. A century later, we find the situation totally changed. The German Empire headed the list with a population of nearly sixty-five million, the United Kingdom was second with a population of forty-five million and France was third with a population of only thirty-nine million. In other words, while the population of the German Empire had nearly trebled and the United Kingdom had increased to two and one half times its earlier numbers, the population of France had increased less than one half. Further inspection of the figures shows that a marked change in the rate of increase of the population of France occurred about the year 1860. At that time France was still in the lead and had already reached a population of thirty-seven million. After that date it

[2] A series of reports on the death rate by Bertillon, Löwenthal, Drouineau, Atthalin, Fevrier, and Strauss; and on the birth rate by Neymarck, March, Bertillon, Rey, Drouineau, Atthalin and Lyon-Caen. Melun, Imprimerie Administrative, Paris.

[3] Burn, Joseph, "Vital Statistics Explained," London, 1914, page 19.

increased only two million, while Germany in the same period almost doubled in population. In 1811, the population of France constituted 16 per cent. of all Europe. One hundred years later the French population constituted only 9 per cent. of the total.

This situation for France may be accounted for principally in terms of its declining birth rate. Such figures as I have for France show that at about 1830 the rate was 30 births per 1,000 of population.[4] The last available figure for 1914 was 18 per 1,000; the death rate was 19.6 per 1,000.[5] This was the first war year, but already in 1911 the death rate, 19.6, exceeded the birth rate, 18.7. The reduction of more than one third in the birth rate during the eighty years was both gradual and continuous. On the other hand, the birth rates in the German Empire and in the United Kingdom continued high, over 30 per 1,000 up to 1895 in the latter and up to 1909 in the former. Since then the birth rates have declined rapidly in both countries, but the enormous increases in population for both Germany and the United Kingdom were achieved before the changes in the birth rate began to make themselves seriously felt.

We are not concerned entirely with gross totals of population. Equally significant is the internal structure of population. As we shall see later, changes in the constitution of a population almost invariably appear with changes in the birth rate. This will become clearer by comparing the ages below which, one quarter, one half and three quarters of the total populations of Germany, of England and Wales and of France, respectively, are found.[6] Thus, one quarter of the population of Germany is under age eleven, one quarter of the population of England and Wales is under twelve years of age, whereas one quarter of the French population is under fourteen years. Again, one half of the population of Germany is found under 23.5 years, one half of the population of England and Wales is below twenty-six years while one half of the French population is below age thirty. We find, finally, that three quarters of the population of Germany is below age forty-one years, of England and Wales is below forty-two years and of France is below forty-nine years. These figures show clearly that the average age of the French population is considerably higher than that of the other two countries. Its youth and its strength form a smaller part of its total population, while its old and its dependents form a much larger part. This we shall find is an invariable consequence of a decreasing birth rate, which reduces the proportion of the young and thus brings into relief an undue proportion of the aged.

The declining national birth rate of France is also severely selective in character. The reduction of the birth rate has affected mostly those who are both economically and socially best fitted to bear and to raise a family to maturity. A careful classification by Bertillon[7] of the number of children per 100 families in Paris, shows that the very poor have the largest number and the very rich the smallest number of children. The order of size of the family is invariably the reverse of the order of economic condition. Since economic status

[4] "Ministere du Travail et de la Prevoyance Sociale," *Statistique Internationale du Mouvement de le Population jusqu'en 1905*, Vol. 1, 1907.

[5] Annual Report of the Registrar-General of Births, Deaths and Marriages in England and Wales, 1915, p. 71.

[6] Burn, Joseph, *op. cit.*, p. 30.

[7] Bertillon, Jacques, "Nombre d'Enfants par Familles," *Journal de la Société de Statistique de Paris*, April, 1901, p. 134.

is highly associated with efficiency and social worth, low birth rates in the best equipped groups of the population can have but one effect on the vital constitution of the next generation—namely a decline in constructive effort for national development.

Evidence suggestive of such decline in national development is afforded by the fact that coincident with a rapidly declining birth rate, France has had a high and rather stationary death rate during the last quarter of a century. England, through the development of its public health service, reduced its death rate to under 14 per 1,000 in the year before the war (1913) when France had a death rate four per 1,000 higher. In spite of the low French birth rate, the infant mortality rate has not been low, and has been coupled with a high still birth rate. The death rate from tuberculosis in France has recently come into public notice here because of war conditions, but it was high before the war. The acute infectious diseases, including typhoid fever, which have so readily lent themselves to control in other European countries and in the United States, show unsatisfactory death rates for France. In fact, we find in this country, side by side with a low rate of reproduction, evidence of indifference to the conservation of the valuable lives that are born. A disturbing element in the French situation to-day is the lack of a national public health program. Is it not possible that such conditions result directly from the absence in the community of those earnest and able men who everywhere further progress along social and economic lines? These leaders of the nation are absent because they were not born.

It is painful to say these things at this time and I should refrain from referring to them were it not for the necessity of emphasizing the facts which so directly affect our own American population problems.

The experience of England has been much less acute, although the tendency of the most recent years has been as disturbing as that in France during the previous decade. In the five-year period between 1871 and 1875, the birth rate was 35.5 per 1,000 of population.[8] In the period 1911 to 1914, inclusive, the birth rate was only 24 per 1,000. The reduction in the birth rate in England has been accompanied, to be sure, with a very healthy decline in the death rate. In the forty-odd years since 1871 this has decreased from 22 to less than 14 per 1,000; whereas the decreasing birth rate in France did not accompany any appreciable reduction in the death rate. The rate of natural increase has, however, declined in England from 13.5 in the period 1871–1875 to 10.1 per 1,000 in the period 1911–1914. England was still increasing in population at the rate of 1 per cent. annually before the war. The reduction in the rate of natural increase and certain internal changes in structure of population had, however, become a source of apprehension to English statesmen and a commission of qualified experts was appointed to study and report on the problem. Their findings[9] have been available for some time and may be summarized as follows:

The birth rate has declined to the extent of approximately one third during the last thirty-five years.

This decline has not been due to any large extent to a decline in the marriage rate or to a rise in the mean age at mar-

[8] Baines, Sir J. Athelstane, "The Recent Trend of Population in England and Wales," *Journal of the Royal Statistical Society*, London, July, 1916, p. 399.

[9] National Birth Rate Commission, "The Declining Birth Rate—Its Causes and Effects," London, 1916.

riage or to other causes diminishing the proportion of married women of fertile age in the population. The decline has been due rather to a conscious limitation of fertility in the large mass of the population.

The decline in the birth rate, although general, has not been uniformly distributed over all sections of the community. It has affected primarily those economic and social groups which, as we have shown for France, are best able to bear and maintain a good-sized family. Thus, we find that the number of legitimate births per 1,000 married males under 55 years in England and Wales was 119 for the upper and middle classes and 213 for the unskilled workmen, with a maximum of 230 among the miners.[10] The birth rate is greater as the economic and social status is lower.

Internal changes of population are taking place in England very similar to those observed in France. Under the influence of the decreasing birth rate the average age of the population of England and Wales is rising and the proportion of old persons is, of course, correspondingly increasing. If we keep in mind also that the mortality rates of females at the adult ages are progressively lower than those for males we are not surprised to find that the increasing proportion of old people is greater among females than among males. While there were, for example, 119 females per 100 males in 1871 at the ages sixty-five and over, the number in 1911 had become 132. The disturbing element in this picture is that the population is growing older not only through the increased longevity of its constituents but more especially through the decreasing reenforcement from its youth and, due to the operation of mortality, that there is a progressive excess of females over males at the older ages. The situation in England may be summed up in the words of her leading demographer, Sir J. Athelstane Baines, as follows:

> In the last forty years, the proportion of people of an age to marry has materially increased, but they marry less and later in life, and thus, to some extent, cause a reduction in the number of births. The main cause of the falling birth rate, however, is the decline in the fertility of the married, due to the voluntary restriction of childbearing, a decline which has been especially rapid since the beginning of the century. The effects of the fall in the birth rate have been neutralized, until within the last few years, by a still greater fall in the death rate. The improvement has not been so marked among the very young and the old as at adolescence and in the prime of life. While, therefore, the rate of natural increase has diminished less than the fall in the birth rate would indicate, it has been maintained at the expense of the young.
>
> As the proportion of infants with a high mortality decreased that of the ages of low mortality increased. The death rate went down, and the balance of population became economically favorable. But as the supply of infants diminishes relatively to the rest of the community, and their elders pass from their prime into the time of life when mortality is heavy, the proportionate supply of potential parents of the most prolific ages tends to decrease, the birth rate falls more rapidly, and the death rate begins to rise, leaving the margin of natural increase alarmingly narrow. The result is an older and less vigorous people; and as the vitality of women is greater than that of men, more of the former sex reach maturity, and they last longer, so that a relatively small and probably wholesome numerical superiority at the working ages is converted into a growing preponderance of old women in the vale of life.[11]

I shall now present the situation for the United States. Superficially, the facts of American population growth present a very favorable picture. Each successive census has shown a marked increase in our total population over the preceding one; that for 1910 showed an increase of nearly 16 million lives over 1900, or 21 per cent.

[10] Annual Report of the Registrar-General of Births, Deaths and Marriages in England and Wales, 1912, p. xxiii.

[11] Baines, Sir J. Athelstane, *op. cit.*, p. 413.

Such data as we have for births and deaths indicate a similar situation. Our birth rate is probably about 25 per 1,000 and the death rate for the entire country not far from 15 per 1,000. The difference between the birth rate and the death rate, the rate of natural increase, is about 10 per 1,000 or 1 per cent. annually. The rate is much the same as we found for England and Wales in the year before the war. No one should find fault with a rate of natural increase of 1 per cent. per year. The population problem of France would be considered on a fair way to solution if that country could maintain for a period of years a rate corresponding to even one half of that which we now enjoy in the United States.

The difficulty with our American situation is that we have been satisfied with a gross showing. We have not looked underneath the surface to observe the varying tendency in the several groups of the population and in the several sections of the country. The marked increase in our total population is in large measure the result of two factors: (1) immigration and (2) a high rate of increase in the foreign born rather than in our native stock. This is shown by the constantly decreasing proportion which the native whites of native parentage form of the total white population[12] In 1870, for example, this group formed 67.8 per cent. of the total white population in the United States, while in 1910 it had decreased to 60.5 per cent. The proportion of the foreign stock correspondingly increased during these forty years. These figures are accentuated if we turn to certain areas of the country. Thus, in the New England states the proportion of the native white stock decreased from 52.3 per cent. of the total white population in 1890 to 40.3 per cent. in 1910. In the Middle Atlantic states the native white stock decreased from 51.8 in 1890 to 44.8 in 1910. In these important areas the native stock is playing an ever smaller part in the composition of the total population. In fact a very definite tendency toward depopulation has already fastened itself upon a large part of the native stock of the country.

There has been a marked and continuous reduction in the birth rate in the United States for a period of years. In the absence of comprehensive birth statistics such as are available for European countries, we must turn to other sources which are clearly indicative of the changes which have occurred in the birth rate. We may use, for example, the number of children under 5, per thousand women in the childbearing ages, namely, fifteen to forty-four years inclusive. Professor Willcox in a recent paper has shown that this proportion has decreased about 50 per cent. in the course of the last hundred years. At the beginning of the century there were 976 children under five for every 1,000 women between the ages of fifteen to forty-four years, whereas in 1910 the number was only 508 per thousand women at these ages. During the 60 years between 1850 and 1910 the number of children under five, per thousand women at the childbearing ages, decreased in the United States by 191 or at an average of 32 in each decade. The rate of decline in the recent decades has been so rapid that Professor Willcox[13] suggests amusedly that if it were continued over a period of a century and a half, which is a comparatively short time in the life of a nation, there would be no children at all at the end of that time.

[12] Thirteenth Census of the United States, Vol. 1, Population: General Report and Analysis.

[13] Willcox, Walter F., "Nature and Significance of the Changes in the Birth and Death Rates in Recent Years," Quarterly Publications, American Statistical Association, Boston, March, 1916, p. 1.

The decline in the birth rate in the United States has been, as elsewhere, selective in character. In Massachusetts, for example, where the best American data on birth rates are available, we find first that there has been a continuous decrease in the birth rate during the last 40 years and second, that this decrease has been most marked in the native stock. In 1910 the native stock had a birth rate of 14.9 per thousand; the foreign born birth rate was 49.1 per thousand.[14] In the same year the native death rate was 16.3 per thousand, while the foreign death rate was only 15.4.[15] There was thus an excess of deaths over births corresponding to a net annual loss of a little more than one tenth of 1 per cent. in the native stock while there was an annual increase of 3.4 per cent. among the foreign born population.

A tabulation of a significant sample of the population returns for the 1910 census shows similar differences in the fecundity of women of native and foreign parentage.[16] In a group of women under forty-five years of age, who were married for a period of from ten to twenty years, the average number of children was found to be 4.1 per married woman. The women of native parentage, however, showed an average of only 2.7 children whereas the women of foreign parentage showed an average of 4.4 per married woman. In like manner, it was found that 7.4 per cent. of the women under forty-five years, who had been married ten to twenty years, had borne no children. The women of native parentage had borne no children in 13 per cent. of the cases, whereas, the women of foreign parentage had borne no children in only 5.7 per cent. of the cases. In view of the fact that very few children are born to women who have been unproductive for a period of at least ten years, we may consider these figures as fairly reliable indices of sterility in the two groups. We find that close to 40 per cent. of the married women of native parentage had borne only one or two children, whereas the women of foreign parentage showed only 19 per cent. of their number in this group. Finally, only about 10 per cent. of the women of native parentage had five children or more whereas 33 per cent. of the women of foreign parentage belong in this group.

I hope I am not assuming too much when I infer that these figures show selection in the decline of the birth rate. The race stock which laid the foundations of our institutions during the critical period of our national existence is in large areas of the country no longer maintaining itself and its place is being taken gradually but surely by foreign races, which, as we have seen, are reproducing very rapidly.

Additional evidence of the selective character of the declining birth rate is presented in special studies on the size of families of college graduates and of men of science. Thus, Phillips[17] in his work on the birth rate among graduates of Harvard and Yale universities shows that the number of children born per married graduate has fallen from about 3.25 in the decade 1850 to 1860, to a little over 2 in the decade 1881 to 1890. Similar facts are observed in the statistics for other college graduates; but none are so low as those for the graduates of colleges for women. Thus,

[14] Commonwealth of Massachusetts, Annual Report on Births, Marriages and Deaths, 1914, p. 181.

[15] Mortality Statistics, 1910, United States Bureau of the Census.

[16] Hill, Joseph A., "Comparative Fecundity of Women of Native and Foreign Parentage in the United States," Quarterly Publications, American Statistical Association, Boston, December, 1913, p. 583.

[17] Phillips, John C., "A Study of the Birth Rate in Harvard and Yale Graduates," *Harvard Graduates Magazine*, Boston, September, 1916, p. 25.

we find that the number of children per married woman graduate of Smith College was only 1.3, of Vassar, 1.6, of Bryn Mawr, 1.7 and of Holyoke, 1.8. Even more significant is the ratio of children per graduate, which, for all of these colleges, is less than one, due to the fact that less than 50 per cent. of the graduates of women's colleges marry.[18] Professor Cattell[19] further shows in his study of 643 American men of science that the families from which the scientific men had come had an average of 4.7 children, while these scientific men who were married and whose families were completed had an average of only 2.3 children, these figures including all the children born. We shall later see how far from adequate such an average number of children is for maintaining the *status quo* in the respective groups.

In the preceding discussion I have referred frequently to the number of children per family in groups of our population and have intimated that some families were small, that others were fairly normal and that others were large. You may now properly ask me what the average number of children per family should be. The answer to the question depends upon the point of view, namely, upon the amount of natural increase one would wish to see in a generation. As there is likely to be a difference of opinion on this point, I shall attempt to show only what the number of children in a family must be, under present conditions, in order that the population may remain stationary; anything above this figure will mean natural increase, anything below will mean a decrease in population.

[18] Nearing, Nellie Seeds, "Education and Fecundity," Quarterly Publications, American Statistical Association, Boston, June, 1914, p. 126.

[19] Cattell, J. McKeen, "Families of American Men of Science," *Scientific Monthly*, March, 1917, p. 248.

It is obvious that the basis of every family is two individuals. The question then resolves itself as follows: How many children must be born to every family in order that two individuals may be raised to maturity? The number of children born must be more than two for a number of reasons. The first is the fact of mortality. The death rate is exceptionally high in the period of childhood, amounting in the first year of life to about 10 per cent. of the babies born. If we begin with 100,000 at birth and trace them through from year to year, we find that about 78,000 are alive at the average age at marriage. This is according to the mortality rate that prevails over a large portion of the United States. The rest have died. This fact alone would make it necessary that every marriage result in an average of $2\frac{1}{2}$ children in order that two persons may attain the average age of marriage and replace their parents in the population. But this assumes first that all persons marry, and second, that every marriage is productive. As a matter of fact all persons do not marry. In our own country from 12 to 15 per cent. do not marry until after the reproductive period, if at all. A considerable proportion of marriages, over 7 per cent., are sterile. When we make the necessary corrections in our figures, the average number of children per family which must be born is increased to close to four[20] in order that the stock may maintain itself without increase or decrease.

I say without hesitation that a large part of the native stock of this country is in this sense not maintaining itself. It is not producing the four children that are necessary to perpetuate the stock. This fact is true primarily for those families in

[20] Sprague, Robert J., "Education and Race Suicide," *Journal of Heredity*, Washington, D. C., April, 1915, p. 158.

the population which, by economic and social standards, are best able to bear and rear 'children' families. On the other hand, those groups in our population which are economically and socially less able to raise families are still producing, on the average, in excess of the minimum necessary to maintain the *status quo*. As a result, the balance of population is in favor of the less economically efficient. The best blood of America is being constantly thinned out by the exercise of a conscious limitation of births and is being replaced by a stock of a different order. Our national standards are being levelled to meet more and more the lower quality of our population.

If I have succeeded in making a plausible diagnosis of one of our national ills, will you permit me, also, to suggest a remedy for the condition? I should say, at the outset, that since many causes have been at work to produce the end result which I have described, it will require many lines of action to improve the situation. I shall, however, suggest some thoughts which seem to me to reach the heart of the problem more nearly than any others.

The state is largely responsible for the present condition. The system of education which it has provided for the youth of the country has failed for the most part to inculcate national ideals. Our young people have grown up without a broad outlook on life. They have been taught to think in terms of personal convenience and advancement and not in terms of the common good. Democratic education is a failure if it neglects to make provision for the character of its future citizenship. Our young men and women must be taught to realize early that we do not live for ourselves; that our intellectual, economic and social advancement must be carried forward not only as tradition but more especially in terms of new vigorous and worthy personalities. Our educational system must make our various racial groups conscious of their best traditions and instil desires to see their better strains strengthened and increased as a foundation of the greater democracy of the future.

The education of our women is especially faulty in this regard. Our schools and colleges, with few exceptions, direct the thoughts and energies of our girls away from ideals of normal home life and center them upon personal refinement or upon personal ambition. It is no uncommon thing to find that girls have gone through their entire college course without a single occasion when the subject of their place in society as mothers and wives was given serious consideration. No wonder that our educated women think mainly of careers or of pleasures offered by society as the aim of existence. These are all false gods which smother the natural and wholesome instincts which every species possesses to insure its maintenance. The old virtues of womanhood need restatement to-day. Whatever else women learn in the schools, they must be educated for their place as mothers, and democratic education must make efficient provision for this primary function.

The state is guilty of another sin. It has made no provision to reward, either substantially or with esteem, the women who, realizing their obligation to the state, are willing to bring up families of normal size. The bearing and rearing of children is costly, both in energy and in funds, and must act as a check on personal ambition and on the enjoyment of the freedom and pleasures of social life. A family of four children will require the attention of the capable woman for many years. Her success as a mother will be at the expense, in the majority of cases, of her achievement in other fields. It is not asking too much

that such a woman should be favored with the admiration of the community in which she lives and not as at present with its commiseration and pity. The state may find it expedient, likewise, to encourage parenthood by considering the size of the family as a factor among others in fixing exemptions from taxes.

Individual selfishness is at bottom the source of the evil I have described. An increasing number of men and women do not assume the marital state or, when married, do not raise a family of children, because they prefer to live better than their forebears and to spend more on themselves than would be possible if they had children to raise and educate. Under present conditions children are not an economic asset. Restrictive compulsory education and child-labor laws make children an expensive luxury which only the poor can afford. In fact, there is no very good reason on the score of personal comfort alone why individuals should assume the obligations and sacrifices which large families entail. Such, indeed, is the logical conclusion of our growing materialism. Yet the shallowness of this attitude must be obvious. Men and women who to-day are rallying to the defense of the country in war time, need not be reminded that we live not for ourselves but rather for the fuller life of the community. If only the same spirit would animate us in times of peace! More would then meet their obligation to the state through parenthood. A new citizenship would then arise which would be worthy to receive the noble traditions from our past and to carry our civilization forward into the future. Our appeal must be made to the religious impulse in our individual lives. It will require all the religious power latent in our people to set us right. I do not mean the mandate of any particular religious sect but rather the ethical force which arises within us when we realize clearly our relation to the community about us and the obligation which this relationship involves. The problem of the size of the family, like a whole host of other important social questions, will be solved only when men realize the holy purpose of life, that we are here to add to the sum total of the common good, in a word, that we must leave the world better than we have found it.

In conclusion, let me emphasize the need for birth release among the healthy and normal people of our country as a primary national duty. Such release must be conscious and deliberate, the act of will of free individuals who thus express a highly moral purpose.

Louis I. Dublin
Metropolitan Life Insurance Company

MINUTES OF THE WAR EMERGENCY BOARD OF AMERICAN PLANT PATHOLOGISTS

A special meeting of the War Emergency Board was held in Washington, D. C., February 9, 10 and 11, 1918. The following commissioners were present: Professor H. H. Whetzel, chairman, of Cornell University; Dr. F. D. Kern, of the Pennsylvania State College; Dr. E. C. Stakman, of the University of Minnesota; Professor H. P. Barss, of Oregon State Agricultural College; Professor H. W. Barre, of Clemson College, S. C., and Dr. G. R. Lyman, of the Bureau of Plant Industry.

Dr. Mel T. Cook, of the New Jersey Agricultural Experiment Station, and Professor H. S. Fawcett, of the Citrus Experiment Station, Riverside, Calif., also took part in the deliberations of the board, and many of the federal pathologists were called in consultation. Open meetings were also held at which practically all the pathological workers of the Department of Agriculture were present, for discussion of the program of war emergency work.

All the commissioners reported practically universal approval of the aims and objects of